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# (54) Wipe incorporating an indicator dye

(57) A wipe comprising a flexible substrate to at least a portion of which has been applied a water insoluble active agent (such as an insect repellant or a polish) which can be transferred to a surface by wiping and an indicator dye which becomes transferred to the substrate along with the active agent, thus giving a visible indication of depletion of the active agent.

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# WIPE CONTAINING A WATER-INSOLUBLE ACTIVE AGENT

In previous patent No. 2007096 and patent application No. 8518736 we have described methods of indicating the presence of impregnants or treatments in substrates of various kinds. Particularly, these inventions have been of value in indicating the continuing presence of useful levels of water soluble disinfectant compositions on wiping cloths for various applications within the food, health-care, dairy and other industries.

The present invention addresses itself to the need to indicate the remaining presence of useful levels of water-insoluble active agents on flexible substrates such as wipes, pads, cloths, sponges, sponge-cloth, mats, clothing, head-bands, mittens and gloves of woven and non-woven fabrics, other fibrous materials, animal skin products (e.g. leather) and animal furs. Further, the present invention covers such articles comprising a substrate, a water insoluble active agent, and a visual indicator of the continuing presence or conversely of the depletion of said action agent, which may be a chemical substance, mixture of formulation.

Particularly, the present invention covers substrates having applied thereto, as active agent insect repellent compositions which may usefully be transferred to inanimate surfaces, human hair or skin, or animal skin, hair or fur. However, the invention is not limited to insect repellents as active agents any chemical agent which could usefully be transferred to a surface, to modify the manner in which the surface interacts with its environment could be used, for instance insecticides, herbicides, fungicides, rodenticides, biocides, timber treatment agents, rot proofing agents, corrosion inhibitors, cosmetics, dermatological agents, polish, pherome attractants or combinations thereof.

According to one aspect of the invention we provide a wipe comprising a flexible substrate to at least a portion of which has been applied a water-insoluble active agent which can be transferred to a surface by wiping and an indicator dye which becomes transferred to the substrate along with the active agent, thus giving a visible indication of depletion of the active agent.

Preferably, active agent has been applied to the substrate as a first step, and the indictor dye in a subsequent step. In that case, the indicator dye is preferably applied in conjunction with a substance in which the dye is soluble but in which the active agent is at least partially insoluble. That substrate is preferably a wax.

More preferably, the indicator dye and the wax are applied in the form of a solution at a temperature above ambient temperature, the solvent being such that the wax is at least partially insoluble in it at ambient temperature. That solvent is preferably more of the active agent that was already applied in the first step.

Thus, we provide a flexible substrate, such as a cloth, wipe-on sponge pad or other form of substrate, preferably a woven or nonwoven textile or fabric to which has been applied, uniformly or otherwise, an agent comprising an active substantially water insoluble component, which component may be in formulation with other materials and may be in aqueous emulsion or dispersion at its time of application to the substrate. Further, there is applied to this treated substrate an indicator system which comprises one or more components which are at least partially insoluble, and preferably are substantially insoluble. in the active component at normal abient temperatures:

along with the dye or pigment, which is preferably soluble in the active component. The said indicator is capable of application in a discreet and clearly delineated form, such as stripes, patterns, images or logos, and will maintain this distinct format subsequent to production and throughout the proper storage of the product. However, upon usage of the product the indicator will fade, blur, or otherwise start to disappear as it is transferred to the requisite surface along with the active component, e.g. when an insect repellent wipe is rubbed on the skin.

More precisely, flexible substrates used in this invention are preferably woven or nonwoven fabrics composed of nautural or synthetic fibres, particularly cellulosic fibres such as viscose, or petrochemical derived polymers such as polyethylene, polypropylene, polyamides and polyesters.

In an insect repellent embodiment of the invention the insect repellent agent is chosen from among those chemicals known to have the relevant properties of safety in use combined with repellent properties. The following are examples: benzil, benzyl benzoate, 2,3,4,5-bis(butyl-2-ene)-tetrahydrofurfural, butoxypolypropylene glycol, N-butylacetanilide, n-butyl, 6,6-dimethyl-5,6-dihydro-1,4-pyrone-2-carboxylate, dibutyl adipate, dibutyl phthalate, di-n-butyl succinate, N,N-diethyl-m-toluamide, dimethyl carbate (cis-dimethyl bicyclo [2.2.1]-5-heptene-2,3-dicarboxylate), dimethyl phthalate, 2-ethyl-2-butyl-1,3-propanediol, 2-ethyl-1,3-hexanediol di-n-propyl isocinchomeronate, 2-phenylcyclohexanol, n-propyl N,N-diethylsuccinamate or citronellol.

In preferred compositions of this invention the insect repellant agent is N,N-diethyl-m-toluamide either alone or in combination with other insect repellant agents. This material is preferably but not of necessity applied to the substrate in the form of a simple aqueous emulsion. A suitable emulsifier is a linear alcohol mixed ethoxylate propoxylate block copolymer.

The indicator system is preferably prepared in the form of a liquid made by dissolving a wax in a solvent, which solvent may be the active chemical, e.g. diethyl toluamide, or may be some other solvent. The wax may be a natural or synthetic hydrocarbon wax, a waxy acid or ester, paritally saponified or polyethylene or polypropylene glycol, or a mixture thereof. It is preferred that the wax has a melting point of above 50°C. A small amount of a wax-soluble dye such as Waxoline Blue, Solvent Green 3, Solvent Yellow 12, Solvent Red 19, 23, 24, 27 or 45, Solvent Black 3 is added to the wax and co-solvent. When all three components have dissolved and mixed, the indicator composition is applied to the impregnated substrate.

Two examples of insect repellant wipes within the scope of this invention are as follows:

Example 1

SUBSTRATE

Viscose polypropylene nonwoven fabric - 50 gram per square metre

IMPREGNANT

N,N-diethyl-m-toluamide (insect repellant agent) dispersed in water with the aid of a nonionic wetting agent, e.g. linear alcohol ethoxylate

| | | | |
|---|---|---|---|
| N,N-diethyl-m-toluamide | 2% | - | 75% |
| Emulsifying agent | 2% | - | 25% |
| Water | 33% | - | 99% |

The impregnant is then applied to the fabric to give a loading of between 2.5 and 50% by weight of diethyl toluamide, but preferably between 10 and 25%.

To this impregnated fabric is added the indicator formulation made up as follows:

| | | | |
|---|---|---|---|
| N,N-diethyl-m-toluamide | 25% | - | 75% |
| Wax | 25% | - | 75% |
| Dye | Trace, to required depth of colour | | |

An especially preferred indicator dye formulation would be:

| | |
|---|---|
| N,N-diethyl-m-toluamide | 75% |
| Wax (hydrocarbon) | 25% |
| Waxoline Blue | Trace |

This indicator formulation is applied to stripes or some other formal to the impregnated and dried substrate, such that a proportion of the substrate having been impregnated receives the indicator. In an alternative embodiment it is possible to apply the indicator over the whole of the substrate, and in such a case only a very small proportion of wax or even no wax at all need to be present.

Example 2

SUBSTRATE

Viscose polyester nonwoven

IMPREGNANT

N,N-diethyl-m-tolumide

INDICATOR

Dimethyl phthalate
Polyethylene glycol 6000
Sudan III dye

If desired other components may be included such as fragrances emollients, sun screens etc.

CLAIMS:

1. A wipe comprising a flexible substrate to at least a portion of which has been applied water-insoluble active agent which can be transferred to a surface by wiping and an indicator dye which becomes transferred to the substrate along with the active agent, thus giving a visible indication of depletion of the active agent.

2. A wipe according to claim 1, wherein active agent has been applied to the substrate in a first step, and the indicator dye in a subsequent step.

3. A wipe according to claim 2, wherein the indicator dye is applied in conjunction with a solvent for the dye and also a substance with which the dye and solvent are only substantially miscible above normal ambient temperature

4. A wipe according to claim 3, wherein the said substance is a wax.

5. A wipe according to claim 3, wherein active agent in addition to that applied in the first step is utilised as the solvent for the wax in the second step.

6. A wipe according to any preceding claim wherein the active agent is or includes N,N-diethyl-m-toluamide.

7. A wipe according to any of claims 1 to 5 wherein the active ingredient is or includes an insect repellant agent, for example benzil, benzyl benzoate, 2,3,4,5-bis(butyl-2-ene)-tetrahydrofurfural, butoxypolypropylene glycol, N-butylacetanilide, n-butyl 6,6-dimethyl-5,6-dihydro-1,4-pyrone-2-carboxylate, dibutyl adipate, dibutyl phthalate, di-n-butyl succinate, dimethyl carbate (cis-dimethyl bicyclo[2.2.1]-5-heptene-2,3-dicarboxylate), dimethyl phthalate, 2-ethyl-2-butyl-1,3-propanediol, 2-ethyl-1,3-hexanediol di-n-propyl isocinchomeronate, 2-phenylcyclohexanol, n-propyl N,N-diethylsuccinamate or citronellol.

8. A wipe according to claim 4, wherein the wax is a natural or synthetic hydrocarbon wax, a waxy acid or ester, partially saponified ester or polyethylene or polypropylene glycol, or a mixture thereof.

9. A wipe according to claim 4 or 8, wherein the indicator dye is Waxoline Blue, Solvent Green 3, Solvent Yellow 12, Solvent Red 19, 23, 24, 27 or 45, Solvent Black 3.

10. A wipe according to any preceding claim, wherein the substrate is chosen from a woven or non-woven fabric comprising natural or synthetic fibers, e.g. cellulosic fibres, or petrochemical derived polymers such as polyethylene, polypropylene, polyamides, or polyesters.

11. A wipe according to any preceding claim, wherein the active agent is chosen from insecticides, herbicides, fungicides, rodenticides, biocides, timber treatment agents, rot proofing agents, corrosion inhibitors, cosmetics, dermatological agents, polish, pheromome attractants or combinations thereof.

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